CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

1. A composition of matter comprising:
a sacrificial polymer that undergoes acid-catalyzed decomposition; and
a catalytic amount of a photoacid generator.

2. The composition of matter of claim 1, wherein the composition decomposes at a temperature range from about 100 to 120 °C.

3. The composition of matter of claim 1, wherein the composition decomposes at a temperature range from about 175 to 200 °C.

4. The composition of matter of claim 1, wherein the composition decomposes at a temperature range from about 100 to 120 °C and leaves substantially no solid residue either from the polymer or the PAG.

5. The composition of matter of claim 1, wherein the composition decomposes at a temperature range from about 100 to 120 °C after exposure to ultraviolet (UV) radiation.

6. The composition of matter of claim 1, wherein the composition acts as an adhesive.

7. The composition of matter of claim 1, wherein the composition is a positive tone sacrificial material.

8. The composition of matter of claim 1, wherein the polymer is chosen from (1) a polycarbonate and (2) a copolymer of polynorbornene and polynorbornene carbonate, and combinations thereof.

9. The composition of matter of claim 1, wherein the polymer is a polycarbonate chosen from polypropylene carbonate, polyethylene carbonate, polycyclohexane carbonate, polycyclohexanepropylene carbonate, polynorbornene carbonate, and combinations thereof.

10. The composition of matter of claim 1, wherein the photoacid generator is chosen from a nucleophilic halogenide, a complex metal halide anion, and combinations thereof.

11. The composition of matter of claim 1, wherein the photoacid generator is chosen from a diphenyliodononium salt, a triphenylsulfononium salt, a diphenylfluoronium salt, and combinations thereof.

12. The composition of matter of claim 1, wherein the photoacid generator is chosen from tetrakis(pentafluorophenyl)borate-4-methylphenyl[4-(1-methylethyl)phenyl] iodonium (DPI-TPFPB), tris(4-t-butylphenyl)sulfonium tetrakis-(pentafluorophenyl)borate (TTBPS-TPFPB), tris(4-t-butylphenyl)sulfonium hexafluorophosphate (TTBPS-HFP), triphenylsulfonium triflate (TPS-Tf), bis(4-tert-butylphenyl)iodonium triflate (DTBPI-Tf), triazine (TAZ-101), triphenylsulfonium hexafluoroantimonate (TPS-103), Rhodosil™ Photoinitiator 2074 (FABA), triphenylsulfonium bis(perfluoromethanesulfonyl) imide (TPS-N1), di-(p-t-butyl) phenyliodonium bis(perfluoromethanesulfonyl) imide (DTBPI-N1), triphenylsulfonium tris(perfluoromethanesulfonyl) methide (TPS-C1), di-(p-t-butylphenyl) iodonium, tris(perfluoromethanesulfonyl)methide (DTBPI-C1), and combinations thereof.

13. The composition of claim 1, wherein the sacrificial polymer is about 1 to 50% by weight percent of the composition, and wherein the photoacid generator is from about 0.5 to 5% by weight of the composition.

14. A composition of matter comprising:

a polymer; and

a catalytic amount of a negative tone photoinitiator.

15. The composition of matter of claim 14, wherein the polymer is chosen from a polycarbonate, and a copolymer of polynorbornene and polynorbornene carbonate, and combinations thereof.

16. The composition of matter of claim 14, wherein the negative tone photoinitiator is chosen from bis(2,4,6-trimethylbenzoyl)-phenylphosphineoxide; 2-benzyl-2-dimethylamino-1-(4-morpholinophenyl)-butanone-1; 2,2-dimethoxy-1,2-diphenylethan-1-one; 2-methyl-1[4-(methylthio)- phenyl]-2-morpholinopropan-1-one; benzoin ethyl ether; 2-methyl-4'-(methylthio)-2-morpholino-propiophenone; 2,2'-dimethoxy-2-phenyl-acetophenone; 2, 6-bis(4-azidobenzylidene)-4-ethylcyclohexanone (BAC-E); and combinations thereof.

17. A method for fabricating a structure, comprising:

disposing a composition onto a surface, wherein the composition includes a sacrificial polymer and a photoacid generator;

exposing at least a portion of the composition to energy; and

removing a portion of the composition to form a first air-gap in the composition, the removed portion corresponding to the portion exposed to the energy.

18. The method of claim 17, further comprising disposing a mask on or above the composition, the mask encoding a profile defining air-gaps to be formed in the composition.

19. The method of claim 17, wherein the sacrificial polymer is chosen from a polycarbonate, and a copolymer of polynorbornene and polynorbornene carbonate, and combinations thereof.

20. The method of claim 17, wherein exposing the composition to energy comprises exposing the composition to a form of energy chosen from optical and thermal.

21. The method of claim 17, wherein exposing the composition to energy comprises exposing the composition to ultraviolet radiation.

22. The method of claim 17, wherein removing portions of the composition comprises removing portions of the composition via heating the composition, leaving a residue of the composition of less than 1% by weight of the composition.

23. The method of claim 17, further comprising:

disposing an overcoat layer onto the composition and into the first air-gap; and

removing the composition using thermal energy to form a second air-gap.

24. The method of claim 23, wherein the thermal energy is in the temperature range of 100 to 120 °C.

25. The method of claim 17, further comprising:

disposing an overcoat layer onto the composition after exposing a select portion of the composition to optical energy and prior to removing the select portion of the composition.

26. A method for fabricating a structure, comprising:

disposing a composition onto a surface, wherein the composition includes a sacrificial polymer and a catalytic amount of a photoacid generator;

exposing a portion of the composition to energy; and

removing the portion of the composition exposed to energy to form an air-gap in the composition via heating the composition to about 100 to 180 °C.

27. The method of claim 26, further comprising disposing a mask on or above the composition, the mask encoding a profile defining an air-gap to be formed in the composition.

28. The method of claim 26, further comprising removing a portion of the composition not exposed to energy by heating to a temperature of about 175 to 200 °C.

29. The method of claim 26, where the sacrificial polymer is chosen from a polycarbonate and a copolymer of polynorbornene and polynorbornene carbonate, and combinations thereof.

30. The method of claim 26, wherein exposing the composition to energy comprises decomposing an organic cation of the photoacid generator, thus generating a strong Brønsted acid.

31. The method of claim 30, wherein exposing the composition to energy comprises thermolytically decomposing the sacrificial polymer with the Brønsted acid.